Date: Wed, 11 Dec 2002 08:43:23 -0800 (PST)
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Subject: abstracts for AAS meeting
To: Carmen B Ascencio <Carmen.B.Ascencio@jpl.nasa.gov>

Hi,
here are the abstracts (there are 2)

Ragh

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1)

New Results from HST on Fast, Collimated Outflows in Dying Stars -- The Primary Mechanism for Shaping Planetary Nebulae

Raghvendra Sahai

\begin{abstract}
The imaging of young planetary and pre-planetary nebulae (PNe and PPNe) with unprecedented high angular resolution and dynamic range using the Hubble Space Telescope (HST), has led to the realisation that almost all of these objects are highly aspherical, with complex multipolar morphologies. The complexity, organization and symmetry of the morphological structures demands radical changes in our understanding of the mass-loss processes during late stellar evolution. We have therefore proposed a model for PN formation in which the primary agent for shaping PNe are high-speed collimated outflows or jets which operate during the late AGB and/or early post-AGB evolutionary phase. Episodic changes in their orientation (or the operation of multiple outflows which operate quasi-simultaneously with different orientations) may explain the widespread presence of multipolar structures and/or point-symmetric morphologies in these objects.

In this paper, we briefly describe the results from imaging surveys of young PNe and PPNe with HST, and then present new results from detailed kinematic studies of several prominent objects which support our hypothesis for shaping PNe. For example, STIS observations of V Hydrae, a carbon-rich AGB star, show extended forbidden-line emission from a very young (about 2 yrs) high-speed (190-260 km s^{-1}) outflow which most likely consists of more than one kinematic component with differing orientations. In the PPN He3-1475, STIS data shows a very young (kinematic age ~ few x 10 yr), high-velocity (2300 km s^{-1}) outflow, collimated close to the central star, along an axis that is misaligned with the bipolar nebula at the center. In CRL618, a PPN currently evolving into a PN (and showing several highly-collimated lobes clustered along the optical axis of the nebula in HST images), we have used ground-based long-slit spectroscopy to study the physical structure of the lobes. We describe a new effort to infer the properties of the fast outflows by modelling specific objects (e.g. CRL618) using numerical simulations of the hydrodynamic interaction of fast collimated outflows with slow spherical circumstellar winds.

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2) The Youngest Pre-Planetary Nebulae: An Optical Imaging and Spectroscopic Survey

Raghvendra Sahai (JPL) and C. Sanchez Contreras (Caltech)

Pre-Planetary nebulae (PPNs) - objects in transition between the Asymptotic Giant Branch (AGB) and planetary nebula (PN) evolutionary phases - hold the key to our understanding of these very late stages of stellar evolution for intermediate mass stars. Observationally, it is well-established that PNs show a dazzling variety of elliptical and bipolar morphologies, whereas AGB stars are surrounded by roughly spherical gas-dust envelopes resulting from dense, slow stellar winds. In the very short (10^3 yr) transition period between the AGB and PN phases ({\it i.e.} the PPN phase), some physical process (or processes) becomes operational which impose bipolarity upon most circumstellar outflows. Although most PPNs have central stars with spectral types between B and K, a few objects (e.g. OH231.8+4.2, V Hydrae) have bona-fide AGB central stars, yet they show strong evidence of bipolarity and/or high-speed outflows in their circumstellar envelopes, indicating that the processes leading to bipolarity can become operational even during the AGB phase.

We report here the results of an ongoing imaging survey of a large list ($\sim$100) of candidate young PPNs. We have constructed a morphologically unbiased sample of such objects from catalogs of OH/IR stars, which are evolved, visually faint, mass-losing stars with dense circumstellar envelopes, showing (generally double-peaked) OH maser emission. The IRAS spectral energy distributions (SEDs) of a large fraction of these objects indicate a lack of hot dust (12 to 25\micron~flux ratio $F_{12}/F_{25}<1$), implying a substantial recent decrease in their mass-loss rates which marks the beginning of their post-AGB evolution. We have discovered several bipolar objects in our survey. Low-resolution spectroscopy to identify the spectral types of the central stars has been carried out from the ground for a smaller number of objects from our list. Some of these show Hα in emission, most likely due to a fast post-AGB wind -- for these, we have used echelle spectroscopy to study the kinematics of this wind.